fact that none are mentioned in Mr. Jukes-Browne's list of the fossils (Quart. Journ. Geol. Soc. xxxi. p. 305), the author proceeded to explain the circumstances under which he had been entrusted with the whole of Mr. T. Jesson's collection from the coprolite-bed for description. The collection is large and important, and the Polyzoa contained exhibit a facies distinct from that of the Jurassic beds on the one hand and of the Upper Chalk on the other. There is but little similarity between the collection now described and the forms known from Warminster and Farringdon. The majority of the Cambridge-Greensand Polyzoa occurred unattached to any matrix; but several examples of attachment have been observed, chiefly to *Ostrea*, *Radiolites*, and species of *Cidaris*.

A list showing the range of the species described preceded the actual descriptions of the following kinds of Polyzoa and Foraminifera, with notes on their relations &c. It included:—

Polyzoa.

Stomatopora gracilis, *Milne-Edw.*
Idmonea dorsata, *Hagenow.*
Entalophora raripora, *D'Orb.*
—— Jessonii, sp. nov.
—— striatopora, sp. nov.
—— gigantopora, sp. nov.
Diastopora cretacea, *Vine.*
—— ——, var. lineata, var. nov.
—— fecunda, sp. nov.
—— megalopora, sp. nov.
Lichenopora, sp.
—— ? paucipora, *Vine.*
Dromopora stellata, *Goldfuss.*
—— polytaxis, *Hagenow.*
Osculipora plebeia, *Novall.*
Truncatula, sp.
Membranipora cantabrigiensis, sp. nov.
Microporella, sp. (? antiquata).
Lunularia cretacea, *Defr. & D'Orb.*

Foraminifera.

Webbina lævis, *Sollas.*
—— tuberculata, *Sollas.*
Trochammina irregularis?, *D'Orb.*
Textularia, sp.

MISCELLANEOUS.

On the Existence of a Nervous System in the Acœlous Planariæ and of a new Sense-organ in Convoluta Schultzii. By M. Yves Delage.

There are in the animal kingdom a small number of creatures with differentiated tissues in which no nervous system has been recognized. Nevertheless the well-known existence in them of sense-organs almost enables us to assert *à priori* that of ganglionic cells and of nerves. Among these creatures are the lowest Planariæ included in the group of the Acœlous Rhabdocœla. In the most recent and the most authoritative work upon this subject, that of L. Graff, these Planariæ are described as having no nervous system. Nevertheless a Russian zoologist, Mlle. Pereyaslawzew, speaking inciden-

tally of the adult in a note treating of the development of the embryo of the Acœla, says :—" I have found the nervous system in the adult Acœla, as well as the digestive cavity, perfectly visible in sections." All our knowledge upon this subject is limited to this phrase, which is not followed by any description or accompanied by any figure.

In one of our most interesting Acœla, *Convoluta Schultzii* (O. Schm.), I have discovered a very developed nervous system, and I have been able to display it with the greatest distinctness, not only in sections, but in the animal when entire.

Nervous System.—Around the otocyst we find a bilobate ganglionic mass, which forms the principal part of the central system. Two other masses, forming a pair, smaller and situated higher up *, are attached to the principal mass by two large connectives, and are united to one another by a transverse commissure. These central parts of the nervous system are composed of fibres and cells. The fibres occupy the centre of the dilated parts, and form almost the whole of the connective and commissural cords. They are exceedingly fine and delicate, undulated and parallel. The cells are situated at the periphery of the dilated parts, and form especially a great aggregation at the postero-inferior part of the principal mass, and a continuous layer around the otocyst. They are of an average diameter of 5 μ to 7 μ, and are polyhedral. In some of them one can see starting from the angles processes which throw themselves into the layer of fibres. Their single nucleus, which is not nucleolated, is 3–4 μ in diameter.

The peripheral system is formed by six parallel longitudinal nerves and their ramifications. These nerves are situated immediately underneath the layer of zoochlorellæ; they form three pairs—an external one, which runs in the folded margins of the body; an internal one, which descends a little beyond the median line; and an intermediate one, situated at nearly equal distances between the two preceding. These last two pairs correspond to the four clear streaks which may be observed in the living animal without any preparation. The internal nerve on each side originates from the principal ganglionic mass which surrounds the otocyst. The two external nerves originate by a short, common, transverse trunk from the small superior mass. A cord starting from the inferior ganglion joins the median nerve at its origin, so that the latter has a double origin. These longitudinal trunks are united by transverse anastomoses, which cut them at right angles, like the rungs of a ladder. These anastomoses are not all perfectly constant in their position, but the variation is not considerable. In a general way they become more and more numerous the further they are from the head. At the inferior extremity the cords converge and resolve

* As usual I place the animal with the head upwards and the ventral surface in front.

themselves into a rich plexus. From the principal cords and from the anastomoses issue numerous very fine filaments which anastomose among themselves so as to form a network with square or rectangular meshes. The nerves are composed of the same fine fibres as the commissures of the central system.

Sense-organs.—Besides the otocyst, notwithstanding what Graff has said, there exist two eyes, represented by two yellow pigment-spots, and I have recognized the existence of a new sensitive apparatus which I shall name the *frontal organ.* It is an ovoid, clear, refringent mass, situated at the superior terminal extremity. It measures about 0·04 millim. by 0·03 millim. The larger end of the ovoid is situated at a small distance from the highest commissure of the nervous system, or even reaches it; the smaller end is applied against the integuments, which, at this level, are destitute of cilia and furnished with short conical papillæ regularly arranged. The mass is bounded at the sides by a double layer of ganglionic cells. A small number of cells of the same kind exist in its interior. From the bounding cells, the central cells, and the nervous commissure start numerous very fine filaments which anastomose in the refringent mass and form a network; then the filaments gradually approach other and converge regularly towards the superior extremity, where they terminate each in one of the papillæ mentioned above. In a great many cases I have been able to trace the filaments from the cells in which they originate to the terminal papilla. The refringent matter performs the function of a sustaining substance. The whole apparatus is very mobile, and the animal seems incessantly to feel about with the papillæ which terminate it.

In young *Convolutæ* just hatched and still destitute of zoochlorellæ the frontal organ exists even more highly developed in proportion than in the adults, and I have been able to demonstrate the nervous system, which is constituted as in the adult, but less condensed and less rich in ramifications.

Lacunæ of the Reticulum.—The nerves appear everywhere surrounded by an endothelial sheath, the cells of which, smooth and flattened on the side towards the nerve, are continuous externally with those of the reticulum. The cavity included between the nerve and its sheath is not entirely virtual. By means of a certain reagent which I shall make known we can demonstrate the existence of a cavity between the nerve and its sheath, and this cavity is continuous throughout with a very highly developed system of lacunæ, which occupies the whole of the zoochlorella-layer. Each of these Algæ is enclosed in a free cavity, and the spaces interposed between these cavities are formed by the lacunæ in question. More circumstantial details upon this point will be given in my forthcoming memoir.

The German zoologists have reproached M. Blanchard with having injected the nervous system of the Planariæ, and described this

nervous system as a circulatory apparatus. But a nervous system is not a hollow organ capable of being injected, and the imputation seems to have been made a little inconsiderately. The discussion not having related to the Accela I do not know how far my results may apply to the Planariæ injected by M. Blanchard; but in all a sheath seems to exist around the nerves, and if the contiguous lacunæ also existed, we should have in them a natural explanation of all the difficulties, and the proof that the mistake has not been entirely on the side of the French zoologist.—*Comptes Rendus*, July 20, 1885, p. 256.

The Nest of the Fifteen-spined Stickleback. By Prof. Karl Möbius.

Among the fishes of the Bay of Kiel the sea-stickleback (*Spinachia vulgaris*, Flem.) is distinguished by the remarkable instinct of constructing a nest for its eggs and young. For this purpose it employs delicate plants which grow in the shallow water, and masses these upon *Zosteræ* or the fronds of seaweeds which wave below the surface of the water or on the piles of landing-stages, until they form a soft rounded mass of 5–8 centim. in diameter. In this nest the female, in May or June, deposits several masses of ova, and the male surrounds the nest with white silky threads and then keeps watch by it.

All this has long been known, but exact knowledge of the constitution of the threads and the place of their origin has hitherto been wanting. The examination of male sea-sticklebacks in May and June 1884, enables me to state that the threads are usually from 0·12 to 0·13 millim. in diameter, and consist of several cords stuck together, which, again, are composed of very fine parallel threads. The substance of which they are composed is nitrogenous, and is a peculiar modification of mucine, as appears from its behaviour towards various acids and alkalies. It is *formed* in the kidneys of the male, and, indeed, in the *epithelial cells of the urinary canals*, which exert this form of activity only at the time of reproduction, and during this period behave towards staining reagents in the same way as the muciferous organs of other Vertebrata.

The kidneys of mucus-bearing sea-sticklebacks are inflated, especially at their posterior extremity. From the kidneys the mucus passes through the ureters into the bladder, which is thereby dilated into a large pyriform vesicle, from the opening of which the mucus finally oozes out as a white thread-forming mass and attaches itself to solid objects that it touches. A male stickleback from the urinary aperture of which mucus protrudes therefore needs only to move around the nest in order to spin round the masses composing it and the adherent ova.—*Schriften naturwiss. Vereins für Schleswig-Holstein*, Band vi. Heft 1, 1885.